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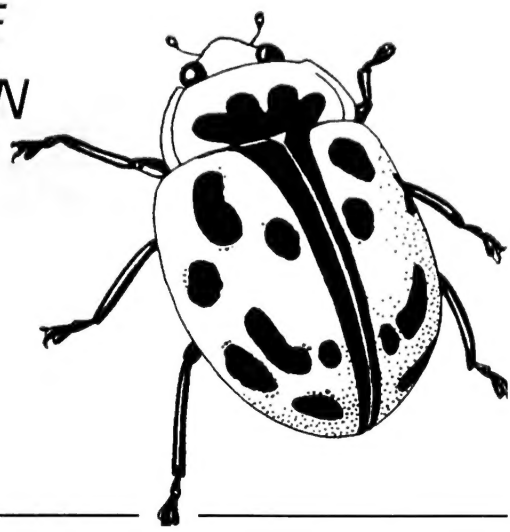
INVERTEBRATE CONSERVATION NEWS



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EDITORIAL

'Citizen science' is one of the themes of an invertebrate conservation conference, scheduled for 31st October 2014 (please see the 'Future UK Events' section of this issue of *ICN*). By encouraging members of the public to observe and study invertebrates, citizen science projects can provide useful information, given adequate quality-control. In any case, widely publicised projects could help to raise awareness of the importance of invertebrate conservation.

As long as 45 years ago, early editions of the newsletter now known as *ICN* often carried the message that invertebrates were not getting enough recognition in 'nature conservation'. The situation is better nowadays but invertebrates continue to receive only a small proportion of the resources allocated to taxon-specific conservation by a wide range of UK conservation organisations. This information (in 2007) was summarised in a poster that the AES displayed at a conference organised by the Zoological Society of London.

When seeking better recognition for invertebrates in conservation, we have often been told that they benefit from conservation programmes that are primarily directed towards the most popular of taxa. There is certainly some truth in this; for example where rivers are brought back into a more natural state, with the iconic otter especially in mind. On the other hand, it is almost axiomatic that any form of intervention in favour of certain species is likely to harm various others.

In the present issue of *ICN*, it is interesting to see the old problem of 'taxonomic favouritism' rearing its head again, as revealed by a study of freshwater species in Africa, where the protected area status of various river

catchments seems to have been more beneficial for birds and mammals than for invertebrates and fish. Perhaps we should therefore regard the relatively neglected fish as honorary invertebrates, just as butterflies and a few other popular invertebrate taxa have sometimes been likened to honorary vertebrates.

Anyway, it seems clear that there are still good reasons for continuing to speak out in favour of invertebrates, however much we may value the work of friends and colleagues whose preference is for fur and feather.

NEWS, VIEWS AND GENERAL INFORMATION

Struggling bees in south-west England

The decline of the UK's pollinating insects continues, rightly, to be in the news (see the last five editions of *ICN* for instance). Accordingly, a recent report (November 2013) from Buglife – The Invertebrate Conservation Trust focuses on 23 species of bee (together with one wasp and five species of oil beetle with overlapping habitats) deemed to be the most "at risk" in south-west England.

The introductory text reminds us of some alarming facts: only six of 19 species of bumblebee are still found over their pre-1960s range. Also, since the 1940s, up to 97% of wildflower meadows in the UK have been lost through agricultural intensification and land development. Given that the report also reminds us that insect pollination of crops is 'worth' around £400 million per annum in the UK, it is paradoxical that more is not done to help our pollinators.

The report is restricted to south-west England, in recognition of the region's "unique conditions resulting from a combination of its climate and diversity of habitats". These make the region home to a diverse assemblage of nationally rare or declining species. There are accounts of each species, which highlight the range of habitats that they rely upon. This information also helps to show how their remaining populations could be helped by careful habitat management and conservation measures. A lot can, for example, be achieved by measures such as grazing in a far more careful manner or by adopting successional cutting regimes for banks, hedges, meadows and even roadside margins, along with appropriate management of landslips, undercliffs and other coastal areas. The main culprits are familiar to readers

of *ICN*: urbanisation; poor (or no) management practices and agricultural intensification. For some species, the damage is exacerbated by the lack of detailed knowledge of their habitat requirements.

There is some good news too, not least that there are amateur and professional entomologists in the Bees, Wasps and Ants Recording Society (BWARS), whose sterling work contributed the main source of data for this report. Although they provided a huge number of records, BWARS members recognise that many of the species are probably under recorded, so that we do not know the true extent of their distributions, or their flower visiting and nesting preferences. Buglife also has its B-Lines project where "Existing wildlife areas will be linked together via the creation and restoration of permanent wildflower rich habitat, as 'stepping stones' or continuous strips of habitat."

As always, to make a difference you need to get involved. The BWARS website can be found at: www.BWARS.com and details of the B-Lines project can be found at: http://tinyurl.com/lqsvmrf

Reference

Horsley, C., Whitehouse, A. & Falk, S. (2013). South West Bees Project. A report on the status of threatened bees in the region with recommendations for conservation action. http://tinyurl.com/prfhbjo

The value of marginal habitats in agricultural landscapes

In the UK's largely agricultural landscape, wildlife habitats have become increasingly limited to marginal areas that are not ploughed, sown with crops, sprayed or otherwise intensively managed. These areas include uncultivated strips around fields and the land adjacent to streams and rivers (called the riparian zone). Within each of these categories, a range of different kinds of soil, vegetation and other characteristics provides a significant habitat resource for native invertebrates (see Marshall and Moonen, 2002).

Two recent papers in the Royal Entomological Society's *Insect Conservation & Diversity* journal focus on the value of field margins of organically managed crops and riparian 'buffer strips'.

The first paper (Stockan *et al.*, 2014) considers whether the marginal strips around organically managed crop fields provide a more bio-diverse habitat than the crop fields themselves. This is an important question, since there is economic pressure to cultivate the field margins, especially if they are no better

for conservation value than the crops that they surround. The study did not, however, provide a very clear answer, since different results were obtained with respect to various invertebrate taxa. For true bugs, species-richness and abundance were significantly higher in the field margins, whereas for spiders and ground beetles there were either no significant differences or the cropped areas scored better. The overall finding was that different ranges of invertebrates were present in the two areas. Thus the authors concluded that, even where organic management may help to protect biodiversity in the cropped area of a field, the margins can provide a valuable resource for conserving "several arthropod taxa".

In the second paper, Birkhofer *et al.* (2014) also set out to test whether a marginal habitat in an agricultural landscape can provide value for biodiversity. This time the marginal habitats were buffer strips along the banks of streams and rivers and the land immediately adjacent. Such margins can link fragmented habitats and provide corridors for species dispersal. They often represent the only relatively undisturbed land in arable areas but their ecological quality varies hugely. Using ground beetles as indicator species, the research group found that these marginal habitats in intensively managed agricultural landscapes do not provide the quality of habitat needed by truly riparian species. With careful planning, however, their role as habitat for woodland species and those that are prone to disturbance could be significant: "increasing habitat heterogeneity at a landscape scale."

In conclusion, these two separate studies underline the need to continue to monitor and improve the relatively small areas of uncultivated land in agriculturally intensive landscapes, even where the habitat provided by these areas is relatively poor or is considered unimportant.

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Stockan, J., Baird, J., Langan, S., Young, M., Iason, G. (2014). Effect of riparian buffer strips on beetles (Effects of riparian buffer strips on ground beetles (Coleoptera, Carabidae) within an agricultural landscape. *Insect Conservation and Diversity* **7**(2), 172-184.

Neonicotinoids: indirect evidence of effects on invertebrate abundance

As mentioned in recent issues of *ICN*, there is an increasing body of evidence that neonicotinoid insecticides can harm invertebrate populations through sub-lethal effects that have not been adequately taken into account in the tests that these products passed in order to gain official approval. It is largely for this reason that the use of certain neonicotinoids has been banned, for the time being, in the European Union.

The widely perceived drop in overall insect abundance is among the problems that have been blamed on neonicotinoids. This is plausible, albeit not proven, since neonicotinoids are very mobile within the plant (thus reaching every part, including pollen and nectar, that might be consumed by non-target invertebrates) and persist for a long time in soil and ground-water. Regrettably, there is relatively little public concern about the apparent decline in invertebrate abundance but the problem has been highlighted by the indirect effects on populations of birds, which depend on invertebrates, either for most of the diet or as an essential diet for raising offspring. Another possibility is that birds could be directly affected by neonicotinoids and/or other pesticides, especially in the case of seed-eating species that might consume contaminated grain.

With the above concerns in mind, a team in the Netherlands has investigated trends in bird populations in relation to concentrations of the most widely used neonicotinoid insecticide, imidacloprid (Hallmann *et al.*, 2014). They correlated local concentrations of this product with population data, going back as far as 1984, from fifteen bird species with a range of foraging habits. Nine of these species are exclusively insectivorous.

Farmland bird population trends have generally been negative in the Netherlands (as in the UK and elsewhere in Europe) but the team found that the trend was greatest, by a statistically significant amount, in areas where the surface-water concentrations of imidacloprid were relatively high. Where the concentration exceeded 20 ng per litre, the average annual decline of bird populations was about 3.5 per cent.

Since the above correlation provided only circumstantial evidence of a causal effect, the team analysed the data further in order to find whether the population trends had changed over the years. They found that the increased rate of bird decline had appeared only after the introduction of imidacloprid to the Netherlands, in the mid-1990s. The evidence was still only circumstantial, leaving open the possibility that there could be a false correlation and that bird populations had declined mainly in response to changes in land-use

that happened to coincide with the increased use of imidacloprid. The team therefore corrected for spatial differences in land use changes that are known to affect bird populations in farmland. The correlation still remained, leading the team to conclude that there is likely to be a real effect of imidacloprid on bird populations.

The study did not directly help to answer the question as to whether birds have declined because of a lack of invertebrate prey, as opposed to a direct toxic effect of neonicotinoids. The Netherlands research team has, however, cited studies that have shown serious declines in the abundance of various invertebrates in parts of the country where imidacloprid concentrations are elevated. These include Diptera, Ephemeroptera, Odonata, Coleoptera and Hemiptera.

Reference

Hallmann. C.A., Foppen. R.P.B., van Turnhout. C.A.M., de Kroon. H. & Jongejans, E. (2014). Declines in insectivorous birds are associated with high neonicotinoid concentrations. *Nature* **511,** 341-343.

EU consultation on biodiversity

The European Commission has published an online consultation to seek the public's views on a future EU initiative (known as 'No net loss') to halt biodiversity loss. Although the EU and its member-states already have various conservation measures in place, such as the designation of protected Natura 2000 areas, almost 25% of European animal species are thought to be at risk of extinction. The new initiative seeks to fill some of the gaps in the current provision. The consultation asks interested citizens, public authorities, business and NGOs for their views on the initiative. It will be online until 26 September and can be found at: http://tinyurl.com/lua6dv3

SITES AND SPECIES OF INTEREST

Shrill Carder Bee in South Wales

In 2010, the statutory conservation agency for Wales, the erstwhile Countryside Council for Wales, published a report by a contractor Matthew Smith on a survey of the Shrill Carder bee *Bombus sylvarum* and twelve other

bumblebee species in the Gwent Levels east of the River Usk in south-east Wales. The Shrill Carder bee was found at 109 widely distributed localities across the eastern Gwent Levels but in greater numbers in the western part of the survey area than in the east.

More recently, in a report to Invertebrate Link, Adrian Fowles on behalf of the agency (now Natural Resources Wales) has outlined the results of a survey further west in South Wales, which identified a small population of the Shrill Carder bee on the Bridgend / Neath / Port Talbot coastal plain in the Glamorgan area. This population, which was found mostly on the northern margins of the Kenfig National Nature Reserve, is surrounded by an estimated 30 km^2 of suitable forage habitat. Yet further west in Pembrokeshire, there are populations of the bee on the Castlemartin military range, where the Ministry of Defence has been co-operating in a project to enhance bumblebee habitats (see *ICN* No. 71).

Despite the discovery of the Shrill Carder bee at Kenfig, it is thought to be the UK's rarest remaining bumblebee, following its disappearance from many parts of England and Wales. Some of its remaining sites in England are brown-field habitats, threatened by housing and other developments in areas such as the Thames Gateway. (Two other species of bumblebee, Cullem's *Bombus cullumanus* and the Short-haired *Bombus subterraneus*, have become extinct but the latter has recently been re-introduced to Kent in south-east England.)

In a new project, the Gwent Wildlife Trust is involving farmers, land-owners, conservationists and the public to help save the rare Shrill Carder bee from extinction. The Trust believes that members of the public can quite easily identify the bee by virtue of its distinctively small size and markings; i.e. pale greenish-yellow with a single black band on the thorax and two dark bands and an orange tip on the abdomen. The high-pitched buzz, from which the bee gets its English name, is another recognisable feature.

The Gwent Wildlife Trust will be working to protect and restore the flower-rich habitats of the Shrill Carder bee, making use of recommendations provided by the UK Bumblebee Working Group. These include the restoration of unimproved meadows and the protection of field margins that are often rich in plants with long corollas.

The populations of the Shrill Carder bee on the Gwent Levels were recorded as visiting 26 species of plant, seven of which were used as pollen sources. The bee's most important forage plants at these sites were Narrow-leaved everlasting-pea *Lathyrus sylvestris*, Common knapweed *Centaurea nigra*, Tufted vetch *Vicia cracca*, Common bird's-foot-trefoil *Lotus corniculatus*

and the non-native sunflower *Helianthus annuus*. The latter, together with Red clover *Trifolium pratensis*, also appeared to be important sources of forage for pre-hibernation queens. The queens also require suitable conditions and materials for their nests, which they construct of fibres from grasses and other plants at or just below ground level.

Information about the Gwent project can be obtained from: Rebecca Price, Gwent Wildlife Trust, Seddon House, Dingestow, Monmouth, NP25 4DY. Email: rprice@gwentwildlife.org

Invertebrates of St. Helena and other UK overseas territories

A UK parliamentary report on the biodiversity of the nation's overseas territories was published last year (Anon., 2013). Of these, the areas with human habitation fall into two main regional groups, the Caribbean and NW Atlantic (Anguilla, Bermuda, Cayman Islands, Montserrat, Turks and Caicos Islands and British Virgin Islands) and the South Atlantic (St. Helena, Ascension and Tristan da Cunha, and the Falkland Islands). Others include Gibraltar and the Sovereign Base Areas of Akrotiri and Dhekelia (in Europe) and the Pitcairn Islands in the South Pacific.

The report includes an overview of the "drivers of biodiversity reduction" across the territories, of which the presence of alien invasive species is of key importance. The endemic fauna of the island of St. Helena, which includes about 400 recorded invertebrate species (Petit and Prudent, 2010), is mentioned in this context. The total number of endemic invertebrates so far recorded in all the UK overseas territories is said to be 500, according to the Overseas Territories Conservation Forum (OTCF). Thus, the St. Helena fauna of 400 appears to be exceptionally important, especially perhaps with regard to the beetles, of which 61% of 256 species are said to be endemic.

In 2011, Buglife – The Invertebrate Conservation Trust sent a team to St. Helena, which lies mid-way between Africa and South America. Renowned as Napoleon Bonaparte's final place of exile, it is one of the most remote human-inhabited islands in the world and is accessible only by boat. An environmentally controversial airport is, however, under construction. The island's flora and fauna, which is less well known than its human history, has evolved in extreme isolation; hence the 400 endemic invertebrate species, which have helped earn the epithet 'the Galapagos of the South Atlantic'.

Although the island's fauna is exceptional, it is thought to be a small remnant of what existed before the first landing by sailors in 1502. The

ensuing deforestation and the introduction of livestock caused massive destruction of habitat long ago, leaving only small relict areas of the habitats of the remaining fauna. St. Helena's endemic plants are now largely restricted to inaccessible coasts and inland cliffs where grazing livestock cannot reach. Many of these plants support highly specialised invertebrates.

St. Helena's remaining endemic invertebrates are threatened by non-native species through predation and/or competition. The latter include rats, mice and alien centipedes and mantids. Also, alien plants threaten to overwhelm the relict habitats. Some of the endemic invertebrates are thought to have become extinct within the lifetimes of the island's present-day human inhabitants. The St. Helena Giant earwig *Labidura herculeana*, the largest earwig in the world, has not been recorded alive since 1967. The same applies to the ground beetle *Aplothorax burchelli*. A dragonfly, the St. Helena darter *Sympetrum dilatatum*, was last recorded alive in 1963. On the other hand, some species might remain to be discovered. Recently, a plume moth new to science, *Agdistis marionae*, was found on the island's endemic Tea plant *Frankenia portulacifolia*.

The Buglife visit in 2011 has been followed by a project funded under the UK Government's Darwin Initiative, which is due to run until January 2016. This also involves the St. Helena National Trust, the St. Helena Government and the Centre for Ecology and Hydrology (Edinburgh). A key aim of the project, called 'Bugs on the Brink: Laying the Foundations for Invertebrate Conservation on St. Helena', is to help restore native habitats as functioning ecosystems. Towards this aim, the plan is to assemble all knowledge of the island's land-based invertebrates and to make sure that this is available to conservationists. The project also includes the development of resources such as identification guides, and to raise awareness of the importance of invertebrates amongst the people of the island, including school children.

The Buglife report on the project (see: www.buglife.org.uk/bug-brink) includes some information about the different ecological zones on St. Helena. The highest area, at 700 to 800 m, is the summit ridge, known as the Central Peaks. It receives the island's highest rainfall and is covered with cloud forest, usually enveloped in mist and comprising cabbage tree woodland and tree-fern thicket. Over half of the 400 endemic invertebrates live there, including about 125 species that apparently occur nowhere else on the island. The flattest area on the island is Prosperous Bay Plain, an area of lava flows occupying about 2.25 km^2 and including a 60 hectare depression (the Central Basin) where the dusty soil and the hot, dry climate have led to

the development of a miniature desert ecosystem, including up to 40 invertebrates found nowhere else. Prosperous Bay is the site of the airport now under construction.

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Petit, J. and Prudent, G. (eds) (2010). *Climate Change and Biodiversity in the European Union Overseas Entities*, IUCN.

Buglife survey of brownfield habitats in Lincolnshire

In a recent report, Buglife – The Invertebrate Conservation Trust has provided information about surveys of six sites, during 2011 and 2013, that it undertook in the Scunthorpe area of North Lincolnshire, near the east coast of England. The surveys include old extraction pits, former landfill sites and active industrial sites such as steelworks, which lie amid a landscape in which habitats are few and far between, owing to intensification of agriculture and urban development. The survey was funded by the SITA Trust and implemented in partnership with Humber Industry Nature Conservation Association, North Lincolnshire Council, Lincolnshire Wildlife Trust and Tata Steel.

The surveys, which included bees and wasps, spiders, beetles, butterflies, moths and flies, revealed populations of regionally uncommon or local species such as the Ruby tail wasp *Chrysis viridula*, the Grayling butterfly *Hipparchia semele* and the crane-fly *Nephrotoma crocata*.

Buglife has also co-ordinated management work in order to enhance and protect the diverse variety of habitats that have developed at some of the sites, including Tata Steel, which occupies approximately 1,200 ha to the east of Scunthorpe and contains areas of bare ground, species-rich grassland, scrub, woodland, wetlands, lagoons, ponds and ditches. The report can be found at: http://tinyurl.com/nz3et7

White-clawed crayfish in Hampshire, southern England

The white-clawed crayfish *Austropotamobius pallipes*, the UK's only native species of crayfish, has Endangered status, owing to loss of habitat and mortality caused by crayfish plague, a disease caused by the oomycete

Aphanomyces astaci (a fungus-like organism), spread mainly by the American Signal crayfish *Pasifastacus leniusculus*, which was introduced to the UK for commercial farming in the 1970s. As mentioned in *ICN* No. 38, the former strongholds of *A. pallipes* included the River Itchen, one of the famous chalk streams of southern England. At the time (June 2002), we reported the disappointing news that the only sign of the crayfish in a survey of the Itchen had been the sighting of a few, possibly relict, burrows. Many sightings had been made on the Itchen until the mid-1990s (Anon. 2000).

Following the survey in 2002, there have been sightings of small numbers of *A. pallipes* in the R. Itchen, believed to be the last remaining in Hampshire, but the population was not considered to be viable in the long term. For this reason, 200 juvenile captive-reared specimens have been released in an effort to help strengthen the population. This has been done through collaboration between the Hampshire and Isle of Wight Wildlife Trust and the Bristol Zoological Society, with the support of the Environment Agency, Natural England and the Centre for Environment, Fisheries and Aquaculture Science. Berried (egg-laden) females were collected from the Itchen in the spring of 2013 and transferred to Bristol Zoo to rear the hatchlings. Some of the resulting juveniles were released into the Itchen in early June 2014, while 200 of them were retained for a second stage of the release next spring. Also, a further 16 berried females were collected from the Itchen after the release. The habitat in the Itchen will be assessed in order to decide whether the offspring of the latter should be released there or instead into a new 'ark site' of the kind described by Buglife – The Invertebrate Conservation Trust (see *ICN* No. 58). Any site for such release must be isolated and protected from the Signal crayfish and the crayfish plague pathogen.

Meanwhile, research workers in Germany (Frings *et al.*, 2012) have designed a barrier that can prevent the invasive Signal crayfish from migrating upstream. The barriers, which have proven effective where water flow rates are sufficiently high, have been designed to allow fish to pass but there is a need to ensure that they would not interfere with the connectivity of European waterways for native migratory species, as outlined in the Water Framework Directive. In any case, the barriers would provide only partial protection against the spread of *A. astaci*, the cause of crayfish plague, since this can be spread by fish, water birds, boats and anglers as well as by crayfish. Another problem, which could have an impact on other wildlife, is that the barriers have to be designed to prevent access to the river bank, since crayfish can crawl over land.

Anglers and members of the public should heed a government-led campaign, which urges them to "Check, Clean and Dry" their boots and equipment after working or walking in or near rivers, in order to help prevent the spread not only of *A. astaci* but also of invasive crustaceans such as the Killer shrimp *Dikerogammarus villosus*.

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RESEARCH NOTES

Less 'charismatic' species should not be forgotten in conservation

The use of popular and showy species as a surrogate for others in the conservation of biodiversity is challenged in a report mentioned in News Alert Issue 281 (March 2012) of the EU Science for Environment policy. The report concerns a study of African freshwater species (Darwall *et al.*, 2011a), which produced evidence that it is not good enough to focus efforts on such species, on the supposition that the information thus obtained is adequate for the purposes of developing all conservation policies and practices.

The study stemmed from a previous one that took place in response to potentially damaging plans to develop irrigation and hydropower in Africa in the next decade. This involved a thorough assessment of freshwater species in Africa, which was published by the International Union for Conservation of Nature (IUCN), providing new data on about 5,000 species. The study, which is said to represent the most complete assessment of African freshwater species to date, led to a conclusion that a lack of available information could no longer justify failure to include freshwater species in conservation and development planning.

The conclusion gave cause for serious concern, since freshwater ecosystems contain 10% of all known species and need to be protected in order to achieve international conservation goals. The latter include conservation targets laid out under the Convention on Biological Diversity's Strategic Plan for Biodiversity to the year 2020. One goal of the Plan is to ensure that at least 17% of inland water areas have protected status.

It is perhaps disturbing that a study was required in order to demonstrate something that seems intrinsically obvious; i.e. to take proper account of freshwater species. Perhaps less obvious, however, is the need to examine the impact of the conservation bias towards more 'charismatic' species. With concern about this bias, some members of the same research team undertook a further study, with part-funding under the EU Project EuropeAid/ENV/2004 819172 and BioFresh projects.

In the second study, analyses were based on distribution maps of 4,203 bird, mammal and amphibian species and 3,521 additional freshwater species (Darwall *et al.*, 2011b). The maps were divided up into 7,079 river catchment areas. The analyses revealed that birds, mammals and amphibians had similar patterns of diversity but that these differed from the patterns found amongst the freshwater species, such as crabs, fish and molluscs.

The study was based partly on an assumption that protected areas should in theory support a higher proportion of the potential range of species than comparable unprotected areas. This seemed to be true for species overall but the protected areas were found to support a higher proportion of the potential numbers of bird, mammal and amphibian species in each river catchment area than of crabs, fish and molluscs. The team suggests that these results show that conservation priorities and investment targets are perhaps based on research that does not adequately represent or benefit freshwater species. They propose, therefore, that their findings should be taken into account in order to help mitigate any adverse effects of future development affecting inland water areas in Africa and elsewhere.

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More on declining moth populations in the UK

Further research into the decline of moths in recent years has been published by Richard Fox and colleagues (see *ICN* No. 72). The current paper (Fox *et al.*, 2014) uses data from 11 million species-occurrence records from 1970 to 2010, covering 673 species of UK macro moth. The populations of 260 of these species declined significantly, while those of 160 species increased. Overall, the frequency of occurrences shows a decline, mirroring the situation of other taxa.

The findings of this study indicate strong links between the decline of the moth populations and increasing urbanisation and agricultural intensification, especially in the south-east of the UK. Moths whose larval host plants are associated with low nitrogen (as a surrogate for uncultivated or unimproved land) and with open environments have declined the most. This finding is consistent with the effects of the above changes in land-use. Meanwhile, the data indicate that climate change has favoured species whose northern limits lie in southern Britain ('leading edge'), while contributing to the decline of those that are restricted to northern Britain ('trailing edge').

Although it was possible to place moth species into a number of types according to their responses to changes in the environment, not all species of a given type behaved similarly. Thus, the picture is probably much more complex than might at first be assumed. The authors conclude that "multi-faceted conservation strategies are needed to minimise negative biodiversity impacts of multiple environmental changes". These, they suggest, include "habitat protection, management and ecological restoration". Nothing new there then!

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Fox, R., Oliver, T.H., Harrower, C., Parsons, M.S., Thomas, C.D. and Roy, D.B. (2014). Long-term changes to the frequency of occurrence of British moths are consistent with opposing and synergistic effects of climate and land use changes. *Journal of Applied Ecology* doi: 10.1111/1365 2664.12256 (online publication).

Offshore wind farm foundations in the North Sea

Amid concerns about the possible adverse effects of wind farms on airborne species (e.g. see *ICN* No. 70), a recent study has identified some of their potential effects on marine ecosystems. The study, reported in Thematic Issue 456 (18 December 2013) of the EU Science for Environment Policy,

concerns the planned construction of hard surfaces in what is currently a soft bottom habitat. Such surfaces favour certain invertebrates, such as mussels, which require firm anchorage, or shelter from predators for larger animals, including fish and crabs.

The research was carried out in the German Bight, where the construction of 5,000 wind turbines is planned over the next 20 years. During 2005-2007, divers studied invertebrates colonising the foundations of a research platform, which simulated the foundations of a wind turbine (Krone *et al.*, 2013a). Of the invertebrates found, three species or groups were especially common; the Blue mussel *Mytilus edulis*; anthozoans (the group of hydroids that includes corals and sea anemones) and the amphipod *Jassa* spp. (tube-building, shrimp-like crustaceans). The Blue mussel predominated at a depth of 1 m, while the anthozoans predominated at 20-28 m depth, together with *Jassa* and a *Tubularia* sp. (a Pink-hearted hydroid).

The researchers estimated that a yearly average of 4,300 kg of biomass accumulated on the underwater structure, which had a total surface area of 1,280 m^2 and a footprint area of 1,024 m^2. On this basis, they estimated that the foundation would accumulate 35 times more macro-benthos biomass (i.e. including the mussels and anthozoa etc.) than the same area of soft seafloor. They then extrapolated their findings on the basis that 5,000 wind turbines are planned for this area of the German Bight. Taking account also of the additional hard surfaces that would be provided by the empty shells of dead mussels falling on to the seafloor, they conclude that the turbine foundations could turn this area into a "biomass hotspot".

The research group undertook a second study during 2007-2009, focussing on larger animals, including fish and crabs, and compared species found on the soft seabed, on shipwrecks and on the research platform (Krone *et al.*, 2013b). Of the species that they found, three occurred exclusively on the wrecks and on the platform. These were the Edible crab *Cancer pagurus*, the Velvet crab *Necora puber* and the Sea-scorpion fish *Taurulus bubalis*. They estimated that the construction of the planned wind farms could greatly increase the numbers of these species, leading to major changes that will affect ecosystems and fisheries.

References

Krone, R., Gutow, L., Joschko, T.J., & Schröder, A. (2013a). Epifauna dynamics at an offshore foundation Implications of future wind power farming in the North Sea. *Marine Environmental Research*. **85**, 1-12.

Krone, R., Gutow, L., Brey, T., Dannheim, J. & Schröder, A. (2013b). Mobile demersal megafauna at artificial structures in the German Bight B Likely effects of offshore wind farm development. *Estuarine, Coastal and Shelf Science*. **125**, 1-9.

PUBLICATIONS

Ditch habitat survey manual from Buglife

In May 2013, Buglife – The Invertebrate Conservation Trust produced Version 6 of *A manual for the survey and evaluation of the aquatic plant and invertebrate assemblages of grazing marsh ditch systems* under the authorship of Margaret Palmer, Martin Drake and Nick Stewart. The manual includes methods for the field survey of the plants and aquatic macro-invertebrates of ditches and a system for evaluating these assemblages. There are also checklists of 'target species' and a scoring system based on the conservation status and salinity tolerance of each species. On this basis, the highest and lowest quality ditches within a wetland can be identified.

The evaluation system was tested and refined during an investigation of grazing marshes in England and Wales between 2007 and 2009, in which 546 ditches were sampled for plants and 533 for invertebrates, of which 326 'target species' were recorded (Drake *et al.*, 2010). Overall, the investigation did not reveal any recent deterioration of habitat and there were signs of a modest improvement in species-richness and/or in the proportion of rare species in ten of the marshes surveyed. Widespread and abundant populations of the alien invasive plants Nuttall's waterweed *Elodea nuttalli* and Least duckweed *Lemna minuta* were, however, found.

The Buglife manual can be found at: http://tinyurl.com/o49qujq

Reference

Drake, M., Stewart, N., Palmer, M. & Kindemba, V. (2010). The ecological status of ditch systems: an investigation into the current status of the aquatic invertebrate and plant communities of grazing marsh ditch systems in England and Wales. *Technical Report* Vol. 2. Buglife – The Invertebrate Conservation Trust, Peterborough.

Review of the scarce and threatened beetles of Great Britain

This review, published by Natural England, replaces the version by Hyman and Parsons (1992; 1994), which was based mainly on the criteria used in the British Insects Red Data Book (Shirt, 1987). Two parts of the review have been published so far, covering the Tenebrionoidea (darkling beetles and applied groups, including the oil beetles) (Alexander *et al.*, 2014) and various families belonging to the superfamilies Buprestoidea (including the jewel beetles), Elateroidea (including soldier beetles and glow-worms), Lymexyloidea and Cleroidea (Alexander, 2014).

For each of the species covered, the new review shows its current and former threat categories, the latter having been listed by Shirt (*op. cit.*) and by Hyman and Parsons (*op. cit.*). The reader cannot, however, easily make comparisons, owing to the adoption of new categories (after the year 2001) in place of the former Red Data Book (RDB) categories. Also, there are certain species listed in the previous review that do not meet the current criteria for listing, either because they are deemed not to be sufficiently threatened or are 'data deficient'. For example, the tenebrionid beetle *Prionychus ater*, an inhabitant of decayed wood (saproxylic) and formerly listed as Notable B, is no longer listed, being known historically from 97 hectads and not showing any evidence of decline.

Overall, the review of the darkling beetles and related families covers 180 species. Six of these, including three oil beetles (*Meloe autumnalis, M. cicatricosis* and *M. variegatus*), are listed as nationally extinct (= Regionally Extinct in the IUCN categories). According to the international (IUCN) criteria, there is one further species, *Abdera affinis*, an inhabitant of the fruit bodies of certain wood decay fungi, which is either also extinct in Britain or belongs to the most severely rated of the current IUCN categories: i.e. Critically Endangered. None of the 180 species is listed as Endangered but nineteen species are listed as Vulnerable, including another two oil beetles, *Meloe brevicollis* and *M. mediterraneus*.

The reasons for the decline of some of these beetles include loss of decaying wood habitat in the case of some of the darkling beetles and the loss of flower-rich grassland in the case of the oil beetles.

The other published part of the Review (Alexander, 2014) covers 114 species, of which five are listed as having become extinct in Britain. One species, a jewel beetle *Aphanisticus emarginatus*, an inhabitant of the stalks of rushes, is listed as Critically Endangered. Three are listed as Endangered, while a further three are listed as Vulnerable, including the Moccas beetle

Hypebaeus flavipes, a saproxylic member of the Malachiidae, which is known only from one site in Britain and could soon be re-listed as Endangered or Critically Endangered.

Both the above parts of the Review are available via the Natural England online catalogue of publications.

References

Alexander, K.N.A. (2014). *A review of the scarce and threatened beetles of Great Britain.* Buprestidae, Cantharidae, Cleridae, Dasytidae, Drilidae, Lampyridae, Lycidae, Malachiidae, Phloiophilidae and Trogossitidae. *Species Status* No. 16, Natural England Commissioned Report No. 134, 80 pp.

Alexander, K.N.A., Dodd, S. & Denton, J.S. (2014). *A review of the scarce and threatened beetles of Great Britain: The darkling beetles and their allies. Species Status* No. 18, Natural England Commissioned Report No. 148, 88 pp.

Hyman, P.S. (Updated by Parsons, M.S.) (1992). A review of the scarce and threatened Coleoptera of Great Britain. Part 1. *JNCC: UK Nature Conservation* No. 3.

Hyman, P.S. (Updated by Parsons, M.S.) (1994). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. *JNCC: UK Nature Conservation* No. 12

Shirt, D.B. (1987). *British Red Data Books: 2 Insects*. Nature Conservancy Council. Peterborough.

FUTURE UK EVENTS

Amateur Entomologists' Society (AES) and British Ecological Society (BES)

- **Friday 31st October 2014: Invertebrate Conservation Conference.**

  Themes: Natural England's Mosaic Approach and Citizen Science as a means of recording wildlife and aiding conservation.

  Venue: Charles Darwin House, 12 Roger Street, London WC1N 2JU, United Kingdom.

  Time: 10:00 to 17:00 (GMT)

  Fee: £20 for AES and BES members; £30 for non-members

  Booking: available online: http://www.amentsoc.org/conferencebooking

  Further information: contact John Millar: jmillar229@btinternet.com

This one-day event is being run jointly by the AES, the BES Conservation Special Interest Group and the BES Citizen Science Special Interest Group. The attendance fee is solely to cover expenses and catering.

The event will provide an opportunity to bring together a variety of experts, professional and amateur alike. Entomologists, field recorders, conservationists, landscape managers and researchers can all look forward to a motivating set of talks and discussions, focussed on the key themes of the day: both offer significant scope and opportunity for invertebrate conservation. Presentations are to include the following:

- Zoë Randle of Butterfly Conservation will speak about "Using citizen science data for conservation".
- A speaker from Buglife – The Invertebrate Conservation Trust will discuss Buglife's highly successful B-Lines project.
- Tim Gardiner will explain how "Climate change drives insects up the sea wall".
- Stephen Miles will explain the importance of bare ground on heathland and other sites for flies, bees and wasps.
- Paul Buckland will talk about the Humberside peatlands; the Thorne and Hatfield Moors raised mires project.
- Thom Dallimore of Edge Hill University, Ormskirk, will reveal new insights into springtails.
- Jon Curson, Senior Environmental Specialist, Invertebrate Ecology, Biodiversity Delivery Team at Natural England, will talk about NE's Mosaic Approach.

CORRIGENDA

We apologise for errors in our article entitled *Decline of grassland butterflies across Europe* (*ICN* No. 73, p. 13-14). Confusion arose from the controversial transfer of *Maculinea* species to *Phengaris*. The following text replaces the second paragraph of the article.

> Seventeen indicator species are covered by the monitoring schemes used in the report. With the proviso that the results are influenced by the enlistment of additional countries during the survey period, it is concluded that European populations of nine of these species have declined. The decline has been steep for the Large blue (*Maculinea arion*) but moderate for the other seven: Small heath (*Coenonympha pamphilus*), Wall (*Lasiommata megera*), Meadow brown (*Maniola jurtina*), Small copper (*Lycaena phlaeas*), Dusky Large blue (*Maculinea nausithous*), Common blue (*Polyommatus icarus*) and Dingy skipper (*Erynnis tages*). Two others, the Orange tip (*Anthocharis cardamines*) and the Adonis blue (*Polyommatus bellargus*) have remained stable, while one species, the Red Underwing skipper (*Spialia sertorius*), has shown a moderate increase. 'Uncertain status' is noted for the remaining six: Marsh Fritillary (*Euphydryas aurinia*), Mazarine blue (*Cyaniris semiargus*), Small blue (*Cupido minimus*), Chalkhilll blue (*Polyommatus coridon*), Large skipper, (*Ochlodes sylvanus*) and Lulworth skipper (*Thymelicus acteon*). Somewhat different conclusions emerge when European Union countries are considered alone; for example, 'uncertain', rather than a steep decline, in the case of *M. arion*.

Also in ICN No. 73, the right-hand running header should have shown "Number 73"; not 72. We are sorry for this error.

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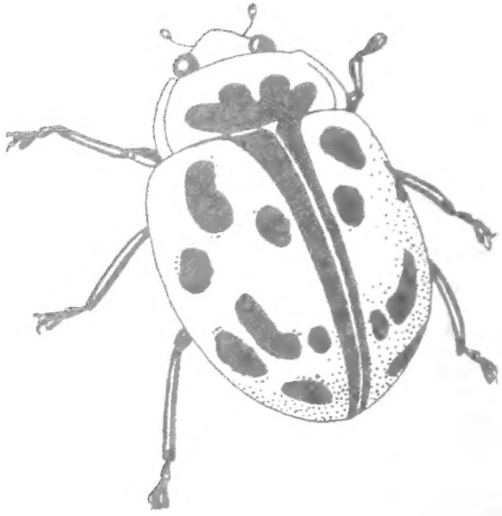

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